Mississippi Canyon 252 Oil Spill

NRDA Sampling Plan

Addendum to the Assessment of Impacts from the Deepwater Horizon Oil Spill on Red Crabs

Deepwater Benthic Communities Technical Working Group

Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment. Each party reserves the right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

This plan will be implemented consistent with existing Trustee regulations and policies. All applicable state and Federal permits must be obtained prior to conducting work.

APPROVED:

Robert W. Ricker — 14 April 2015

Department of Commerce Trustee Representative: — Date

[signature] — April 15, 2015

BP Exploration & Production Inc. Representative: — Date

Louisiana Trustee Representative: — Date

Addendum to the Assessment of Impacts from the Deepwater Horizon Oil Spill on Red Crabs

Deepwater Benthic Communities Technical Working Group

March 5, 2015

1.0 Background and Objectives:

Beginning in 2011 a cooperative effort was undertaken to help identify any potential impacts from the Deepwater Horizon (DWH) oil spill on the resident deepwater benthic red crab communities in support of the Natural Resource Damage Assessment (NRDA) injury-assessment process. The efforts were conducted pursuant to the cooperative work plan, "Assessment of Impacts from the Deepwater Horizon Oil Spill on Red Crabs," approved January 9, 2013 (hereafter referred to as the "2011 Red Crab Cruise Work Plan"). The effort included three tasks completed as part of the NOAA R/V Pisces cruises conducted on July 27-Aug 7, 2011 andAug 8- Aug 17, 2011.

1) Collection and documentation of potential exposure of red crabs to spill-related contaminants, including petroleum hydrocarbons, metals, dispersants and dispersant by-products;
2) Collection of tissue samples to document potential reproductive and histological effects of exposure to petroleum hydrocarbons, metals, dispersants and dispersant by-products, or indirect effects of the DWH oil spill; and,
3) Calculation of catch per unit effort (CPUE) at selected study locations, including near field, historic, and seeps locations.

This addendum to the previous work plan extends, and in some cases modifies, the efforts outlined in the original work plan. Specifically, this addendum outlines a follow-up cruise and subsequent analyses to take place August 22 - September 12, 2014 for the purposes of:

1) Collection and documentation of potential exposure of red crabs to spill-related contaminants, including petroleum hydrocarbons and metals[1];
2) Collection of tissue samples to document potential reproductive and histological effects of exposure to petroleum hydrocarbons and metals, or indirect effects of the DWH oil spill; and,
3) Calculation of catch per unit effort (CPUE) at selected study locations, focusing more intensively on more locations around the wellhead.

[1] Dioctyl sodium sulfosuccinate (DOSS) will not be measured in crab tissues. The majority of the tissue samples in 2011 did not contain detectable concentrations of DOSS.

2.0 Methods and Approach:

The methods and approaches pursuant to this addendum will be identical to those methods and approaches detailed in the 2011 Red Crab Cruise Work Plan, with some exceptions which are detailed in the sub-sections below.

All materials associated with the collection or analysis of samples under these protocols or pursuant to any approved work plan, except those consumed as a consequence of the applicable sampling or analytical process, must and will be retained unless and until approval is given for their disposal in accordance with the retention requirements set forth in paragraph 14 of Pretrial Order # 1, paragraph 6 of Pretrial Order #30, the entirety of Pretrial order #16, which details the retention of metadata, and any other applicable Court Orders governing tangible items that are or may be issued in MDL No. 2179 IN RE: Oil Spill by the Oil Rig "DEEPWATER HORIZON" (E.D. LA 2010). Such approval to dispose must be given in writing and by a person authorized to direct such action on behalf of the state or Federal agency whose employees or contractors are in possession or control of such materials.

2.1 2014 Field Effort:

The 2014 follow-up field effort will target some of the same areas identified in the 2011 Red Crab Cruise Work Plan with modifications to red crab collection locations as described below. Two trap lines will be deployed at selected areas; for all other sites only one trap line will be deployed. Table 1 lists the site names and locations. The methods and approaches for the 2014 follow-up field effort will be identical to those relevant methods and approaches detailed in the 2011 Red Crab Cruise Work Plan, with the following exceptions:

Red crab collection locations

- Two trap lines will be set at area A1: no traps will be set at the shallow depths (between 800-900m; due to insufficient crab catches at this depth range in 2011), and two traps will be set at deeper depths (deeper than 1000m). The 2011 cruise was unable to set two trap lines at the site A1 Deep (A1D) due to problems with the pot hauler. Two trap lines will be set at A1D for the 2014 cruise.
- Only one trap line will be set at the NF1 and NF2 sites due to their proximity to one another. There must be at least one mile, with a recommended two miles, between trap lines in order to avoid potential line entanglement. Setting only one trap line at NF1 and NF2 will also ensure consistency with the procedures established during the 2011 cruise.
- No trap lines will be set at sites A2, A6, MC388, or GC600. No crabs were collected at sites A2, A6, and MC388, and one crab was collected at GC600 in 2011. Due to the lack of samples from these locations, these stations cannot provide adequate reference information. Forgoing collection at these stations will reduce transit times between stations.

- No trap lines will be set at A4A, or A4B; two trap lines will set at A4C, the deeper of the A4 locations (deeper than 800m). The shallower A4 sites, A and B, did not have a sufficient number of crabs to provide adequate reference information.
- Crabs will be collected at additional near field sites (within 25km from the wellhead). Crab collection was not attempted at these near field sites during the 2011 cruise. Approximate locations of the additional near field sites are listed in Table 1 and displayed in Figure 1. Only one trap line will be set at each of these locations.

Sample collection

- The research team will endeavor to sample 20 or 40 randomly selected crabs at each site location[2]. As described above and in Table 1, crabs will be collected at additional sites, increasing the total number of sites from 24 for the 2011 effort, to 39 for the 2014 effort. Due to the increase in total number of sampling sites, fewer crabs may be sampled at each site in order to obtain an adequate number of samples. Therefore, twenty crabs will be sampled at the near field sites[3]. However, in the interest of sampling a larger number of crabs from far field sites, 40 crabs will be sampled at the four far field stations[4]. Collected male and non-ovigerous crabs in excess of 20 at the near field sites, and 40 at the far field sites will not be sampled; however all ovigerous female crabs caught in traps will be sampled, dissected, and sent for analysis[5].
- No bycatch will be sampled; but data and information on bycatch will be qualitatively collected.

[2] Crabs will be selected for tissue sampling from the crabs collected at each site using a random number generator. For each site, collected crabs will first be taken from the traps, enumerated by sex, and placed in a single compartment of a compartmentalized seawater system tank. The research team will use a random number generator, specified to provide only 20 or 40 unique numbers (dependent on the site), based on the total number of crabs collected, and sorted from least to greatest, to produce a list of the crab numbers selected for tissue sampling. One research team member will take each individual crab from the original compartment of the seawater system tank, and crabs will be consecutively counted as they are removed from the holding compartment. Crabs will be placed in a "yes" or "no" compartment based on whether their consecutive number is one of the randomly selected numbers (i.e., if their number is one of the 20 or 40 unique numbers they will go in the "yes" compartment and be held for tissue sampling). All other crabs will go in the "no" compartment and be kept as a whole crab sample for archive. If any ovigerous crabs remain in the "no" compartment, they will be selected for tissue sampling in excess of the 20 or 40 randomly selected crabs. The researcher selecting crabs from the seawater system tank will be kept blind from the list of randomly selected numbers. Only after the researcher has physically selected a crab will a second researcher reveal if the crab will be sampled, or not.

[3] Sites: MC253, MC295, MC342, MC118A, NF4, MC296, MC250, MC382, NF1, NF3A, NF3B, A1DB, NF2, MC207, MC338A, MC118B, MC208A, MC251, MC211, MC248, MC297, MC165, MC299, MC337, MC208B, MC166, MC338B, MC336, MC209, MC255, MC384, A1DA, MC254, MC339, and MC293.

[4] Sites: MC853A, MC853B, A4CA, and A4CB.

[5] Any crabs sampled in addition to the randomly selected crabs will be identified as "selected" on the crabs' associated datasheet.

Chemical analyses

- Dioctyl sodium sulfosuccinate (DOSS) will not be measured in crab tissues. The majority of the tissue samples in 2011 did not contain detectable concentrations of DOSS.

Tissue dissections

- Hepatopancreas, and egg tissue samples will be the only tissues collected for analyses. Samples from muscles, gills, and gonads will not be collected. The focus on hepatopancreas tissues stems from the apparent accumulation of PAHs in this organ, and the focus on eggs reflects a continued concern related to potential reproductive effects of spill-related contaminants on red crabs.
- Hepatopancreas tissue samples will be analyzed for hydrocarbons and metals, and histological endpoints[6]. Egg samples will be analyzed for hydrocarbons and the same reproductive indices targeted during 2011 including egg viability, morphometry, fecundity, and developmental stage.

On-board procedures

- Traps will be decontaminated between sites using Contrad and rinsing with saltwater.
- All dissecting tools, including the cutting board and instruments will be decontaminated with Contrad and rinsed with isopropyl alcohol, and then distilled, deionized water.

[6] Histological endpoints include: distribution and severity of melanized granuloma; distribution and severity of melanized areas of degeneration in the interstitium of the hepatopancreas; frequency of reserve inclusion (RI) cells; size of reserve inclusion (RI) cells; severity of R-cell vacuolation; frequency of B-cells; distribution and severity of B-cell vacuolation; presence and severity of idiopathic basophilic, cellular inclusions in the digestive tubular epithelium; presence and severity of interstitial hemocytic infiltrate; presence and severity of interstitial fixed phagocytes; and relative content of food material/digestive enzymes in lumen of digestive tubules. Additional pathologies may be recorded, if discovered.

Table 1. List of 2014 Sampling Locations, 39 Station-Sites[7].

Station-Site ID	*Latitude*	*Longitude*	*Distance from Wellhead (km)*	*Sampled During 2011*	*Estimated Depth (m)^*	*Prioritization level*
MC253	28.75190	-88.35280	2.0	No	1524.5	Primary
NF4	28.72010	-88.36610	2.0	No	1604.1	Primary
NF1	28.74390	-88.38700	2.2	Yes	1440.6	Primary
NF2	28.73170	-88.40340	3.7	Yes	1495.6	Primary
MC208A	28.77240	-88.39910	5.0	No	1410.1	Primary
MC297	28.70480	-88.33160	5.0	No	1494.5	Primary
MC208B	28.79380	-88.36380	6.2	No	1440.7	Primary
MC209	28.78400	-88.31690	7.0	No	1267.3	Primary
MC254	28.73570	-88.29450	7.0	No	1501.5	Primary
MC295	28.69130	-88.41380	7.0	No	1511.1	Primary
MC296	28.67280	-88.36880	7.3	No	1671.8	Primary
NF3A	28.69890	-88.44620	9.0	Yes	1293.5	Primary
MC207	28.79880	-88.42690	9.0	No	1327	Primary
MC251	28.74110	-88.45780	9.0	No	1467.1	Secondary
MC165	28.83950	-88.36150	11.3	No	1021.4	Primary
MC166	28.81370	-88.28920	11.3	No	1267.6	Primary
MC255	28.71600	-88.25370	11.3	No	1702.4	Primary
MC339	28.66250	-88.44260	11.3	No	1350.4	Primary
MC342	28.66350	-88.28800	11.3	No	1550.4	Primary
MC250	28.73420	-88.50030	13.2	No	1381.9	Primary
NF3B	28.71240	-88.50310	13.7	Yes	1291	Primary
MC338A	28.65570	-88.47970	14.4	Yes	1497.6	Primary
MC211	28.79790	-88.22850	15.0	No	1317.1	Secondary
MC299	28.70290	-88.21810	15.0	No	1785.1	Secondary
MC338B	28.63660	-88.46700	15.0	Yes	1571.7	Primary
MC384	28.60320	-88.37250	15.0	No	1824.7	Secondary
MC293	28.70340	-88.53000	16.5	No	1346.4	Primary
MC118A	28.83790	-88.51140	18.0	Yes	934.7	Primary
MC382	28.61380	-88.49750	18.9	No	1669.8	Primary
A1DB	28.90910	-88.35840	19.0	No	979.3	Primary
MC118B	28.82090	-88.54430	19.7	Yes	930.2	Primary
MC248	28.73320	-88.57560	20.0	No	1088.8	Primary
MC337	28.63170	-88.55130	21.6	No	1603.1	Primary
MC336	28.66700	-88.59080	23.4	No	1401.5	Primary
A1DA	28.94820	-88.34700	23.4	Yes	1053.2	Primary
MC853A	28.12810	-89.14450	102.1	Yes	1089.8	Primary
MC853B	28.08510	-89.12890	104.2	Yes	1105.2	Primary
A4CA	27.74990	-85.52460	300.8	Yes	880	Primary
A4CB	27.70770	-85.45800	302.0	No	833.5	Primary

^Depths are estimated based on previous samples from the 2011 Red Crab Cruise Work Plan, or based on ArcGIS bathymetry layer.

[7] Station-site locations are approximate, exact locations will depend on sea conditions, presence of pipelines (based on the institutional knowledge and experience of the crew), or sampling arrays in the vicinity of the set.

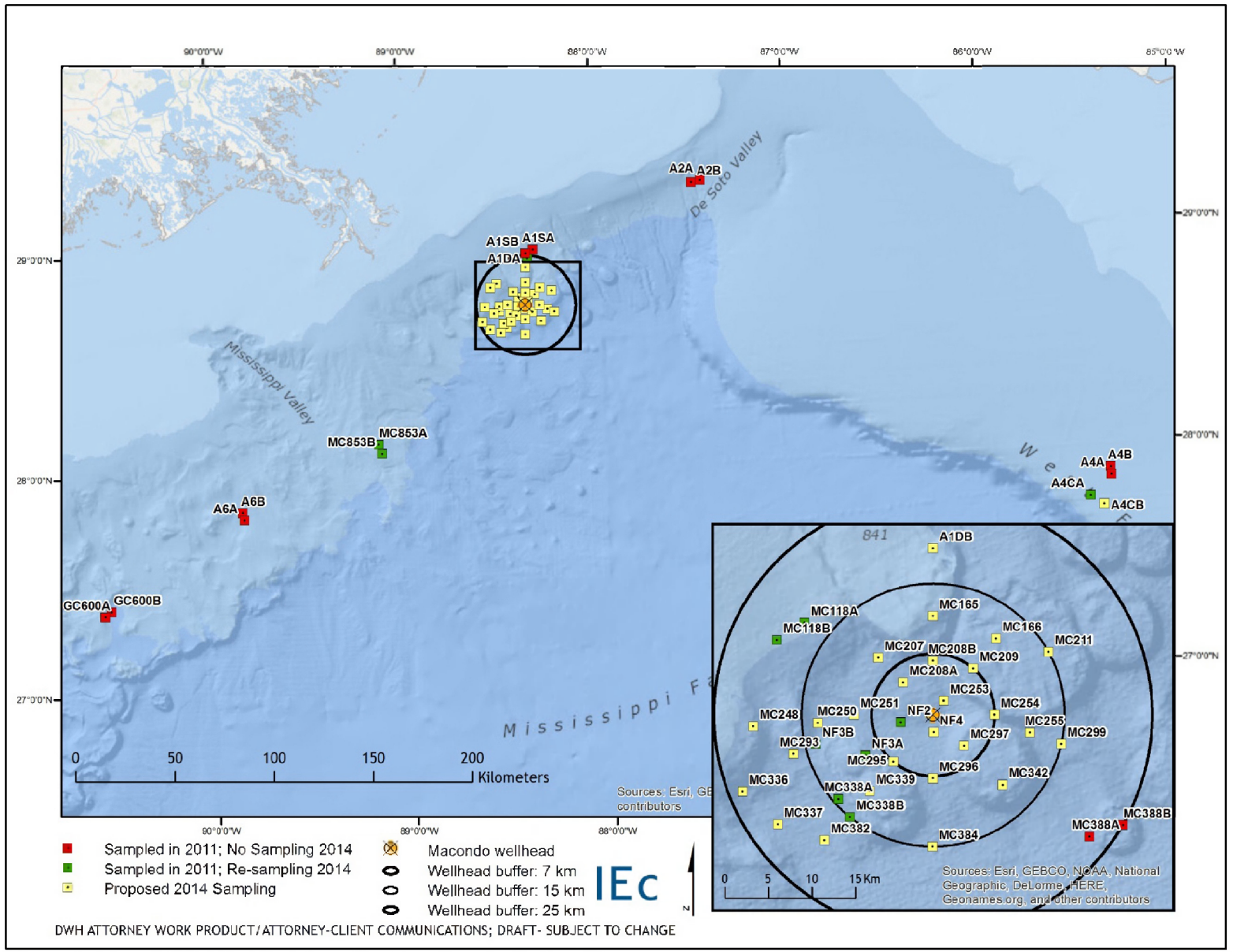


Figure 1. Map of 2014 Red Crab Sampling Locations by Station-Site

2.3 Analysis of Tissue Samples Collected During the 2014 Field Effort:

Subsequent to the 2014 field collection effort, collected tissue samples will be analyzed in a manner consistent with the methods detailed in the 2011 Red Crab Cruise Work Plan, with the exceptions already noted above.

3.0 Milestones and Deliverables:

- Cruise Report — Within one month of cruise completion. The cruise report will include the following sections:
    - Background and Objectives.
    - Approach and Methodologies:
        - Cruise Dates and Personnel
        - Sampling Site Locations
        - Water Quality Measurements
        - Gear Description and Trap Deployment and Retrieval
        - Crab Maintenance Onboard
        - Dissection of Red Crabs
        - Summary of samples for laboratory analyses[8]
            - Sample ids, number of samples, collection locations and dates of samples for each analysis type (egg and tissue chemistry, tissue histology, reproduction, reproductive histology, population metrics)
        - Discussion of Trap Bycatch
    - Results: Sample Description
        - Sample Site Locations
            - Actual Crab Sampling locations
                - Table with GPS locations
        - Deviations in approach and methodologies from Cruise Plan
- Results from documentation of potential exposure of red crabs to spill-related contaminants, including petroleum hydrocarbons, and metals— approximately one year after cruise completion.
- Results from the collection of tissue samples to document potential reproductive and histological effects of exposure to petroleum hydrocarbons, and metals— approximately one year after cruise completion.

4.0 Key Personnel:

- **Harriet Perry** - Gulf Coast Research Laboratory, University of Southern Mississippi
- **Darcie Graham** – Gulf Coast Research Laboratory, University of Southern Mississippi
- **Maryjean L. Willis**- NOAA, National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle Laboratory
- **Anson Hines** – Smithsonian Institute, Smithsonian Environmental Research Center

[8] Sample summary products will be developed by the Trustee Data Management Team.

- **Mark Myers** – Myers Ecotoxicology Services, LLC

5.0 Safety Plans:

The 2014 field effort will be conducted on a NOAA vessel, Pisces. The ship's operational safety procedures will be followed at all times. MSDS hazardous materials sheets will be posted as well. Principal investigators may merge these safety plans with other applicable university or participating organization practices.

6.0 Protection of Sensitive Marine Species:

Best management practices for the protection of sensitive marine species will be employed at all times on board the vessel. Best management practices are provided in Appendix A. If an accidental take of a protected species occurs, the accidental take procedures will be followed. Accidental take materials are included in Appendix B, and will be made available on board the vessel.

7.0 Data Sharing:

7.1 Digital and Shipboard Data

All data and imagery (including navigation, instrument data, field logs, photographs and documentation), acoustic, and other electronic data will be saved to an on-board computer, and all data shall be migrated to a dedicated external hard drive. The data will be controlled and managed by the NOAA NRDA data manager under project protocols, including Chain-of-Custody tracking of the external hard-drive. Upon return to port, the Data Manager shall deliver copies of all data on the external hard-drive, including copies of Chain-of-Custody forms, to the Trustees and BP simultaneously by uploading all data to the NOAANRDA.org website.

Under the direction of the Chief Scientist, a NOAA Data Manager on board each vessel will email a daily report on sampling progress to a designated list of recipients that includes Trustee and BP representatives. The Trustee Data Management Team (DMT) will be responsible for digitizing the data from the field sample forms into a summary file.

7.2 Laboratory Data

Tissue samples for the analysis of hydrocarbons and other chemical contaminants will be sent to the appropriate contractor (Alpha Analytical Laboratories for hydrocarbons and ALS Kelso for metals) of the NRDA Trustees. Tissue sub-samples preserved for histology will be sent to the NOAA NWFSC Montlake Facility for histological preservation. Histological slides will be read by Dr. Mark Myers. Egg samples (except aliquots sent for chemical analysis) will be sent to the laboratory of Dr. Anson Hines, at the Smithsonian Environmental Research Center (SERC), for evaluation of egg health.

Water samples for hydrocarbon analysis and egg samples for egg viability and morphometry analyses will be offloaded from the vessel using runner boats and shipped to Alpha Analytical

Laboratory and SERC, respectively, every two days. The remaining samples will be stored on board the vessel and transferred at the end of the cruise.

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the Trustee Data Management Team (DMT), at which point they will be uploaded to NOAANRDA.org and available to the Trustees and BP. The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the Trustees' Data Management Team (DMT). Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Analytical Quality Assurance Plan, after which time the validated/QA/QC'd data (depending on the nature of the data) shall be made available simultaneously to all Trustees and BP. Any questions raised on the validated/QA/QC'd results shall be handled per the procedures in the Analytical Quality Assurance Plan and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC'd data set released by the DMT shall be considered the consensus data set. In order to assure reliability of the consensus data and full review by the parties, no party shall publish consensus data until seven days after such data has been made available to the parties. Also, the LADP shall not be released by the DMT, LOSCO, or BP or its contractors prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation/QA/QC, any released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all Trustees and to BP.

8.0 Costs:

The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher due to a number of potential factors. As soon as factors are identified that may increase the estimated cost, BP will be notified and a change order will be provided describing the nature and cause for the increased cost in addition to a revised budget for BP's consideration and review. The project costs indicated below are to be submitted by the Trustees for reimbursement by BP.

Item	Estimated Budget
University of Southern Mississippi Cruise Participation, including travel	$450,000
Other Personnel costs (including preparation and participation in cruise)	$40,000
Vessel and Equipment Costs (including consumable items, mobilization and demobilization)	$610,000
Reproductive Health Assessment	$75,000
Histology Assessment	$75,000
Reporting and Analysis	$30,000
Total	**$1,280,000***

*Excluding costs of chemical contaminant analyses by NOAA Trustees analytical chemistry laboratories (Alpha Analytical Laboratories) to be covered separately outside project budget.

Appendix A
Best Management Practices for the Protection of Sensitive Marine Species

Vessel Strike Avoidance Measures and Reporting for Mariners NOAA Fisheries Service, Southeast Region

Background
The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training
Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance
In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews should maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel should attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners should check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews should report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties should remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office should be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

Protected Species Interaction Prevention Procedures for No-impact Gear Types

For data collection efforts involving a number of gear types that are routinely deployed for measuring physical properties of the ocean or collecting plankton samples, the trustees and BP have determined that there will be no effect on protected species (endangered and threatened species, and marine mammals) under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) if deployed according to standard protocols.

Endangered and threatened species considered to potentially occur in the sampling area.

Common Name	Scientific Name	Status
leatherback sea turtle	*Dermochelys coriacea*	endangered
loggerhead sea turtle	*Caretta caretta*	threatened
Kemp's ridley sea turtle	*Lepidochelys kempii*	endangered
green sea turtle	*Chelonia mydas*	threatened
hawksbill sea turtle	*Eretmochelys imbricata*	endangered
sperm whale	*Physeter macrocephalus*	endangered

In depths greater than 200 m, Kemp's ridley, green, and hawksbill sea turtles are expected to occur in such low abundances that they are discounted from any potential effects occurring to these species. Leatherback and loggerhead sea turtles, and sperm whales are considered further for potential adverse effects. In addition, non-listed species of marine mammals are also considered for the potential of incidental capture and entanglement occurring.

The gear types considered for their potential to incidentally capture or entangle protected species include:

- CTD and rosette samplers and instruments attached to these arrays
- Radiometers
- Bongo nets
- Neuston nets
- Vertically deployed or towed imaging systems
- $1m^2$ MOCNESS
- $10m^2$ MOCNESS

CTD and rosette samplers (with associated instrument packages) and radiometers are typically deployed in a vertical cast. The instruments are deployed on a cable and have no loose lines or other entanglement hazards for protected species.

Bongo nets are typically deployed on a cable down to a depth of up to 200 m and neuston nets are deployed in the upper 1 m of the water column. The small size of these nets (neuston net 2 square meters, 2 bongo nets of 0.5 square meters each) and the lack of a loose line makes the likelihood of capture or entanglement of a marine mammal or sea turtle exceedingly small. In more than two decades of the SEAMAP program conducting bongo and neuston tows, no incidental captures of marine mammals or sea turtles have occurred.

Imaging systems such as the Digital Automatic Video Plankton Recorder (DAVPR) are either lowered vertically through the water column or towed on a conducting cable. The overall footprint of the instrument package is small and the wire is kept tight for proper deployment. No loose lines are present.

Neuston net – 2square meters
Bongos are each ½ square meter for a total of 1 square meter
Manta Neuston net – approximately 0.5 square meter

$1m^2$ MOCNESS and $10m^2$ MOCNESS nets are deployed up to 2000m or more in depth (typically targeting 1500m). The net system is mounted on a rigid frame and no loose lines are hanging in the water. Although larger than bongo and neuston nets, these nets are still relatively small and only sweep a very small percentage of the water volume. The heavy, rigid frame results in a sinking rate of approximately 20m/s and thus the net is descending through the upper water column quickly. The nets are towed at 1.5 to 2.5 knots and tows last about 4 – 6 hours. Thus, for the 10m MOCNESS, the average volume swept in a deployment (assuming 1500m descent and a 5 hour tow at 2 knots) is approximately 215,000 cubic meters of water. Since sampling stations are on 30 nautical mile centers, the percentage of volume swept by a $10m^2$ MOCNESS, not including the volume below 1500m is 0.0000046% or approximately 1 in 215,165. Given that the most abundant turtle species, the leatherback has approximately 1 animal per 417 sq km of ocean in waters greater than 200m depth, if it is assumed that this density remains the same for waters in excess of 1500m, there are approximately 7.4 leatherbacks per 30 nm x 30 nm cell. Thus, if the animals were randomly distributed within the water volume and did not move, the probability of capturing one in the $10m^2$ MOCNESS is 1 in approximately 29,000 tows. Similarly, loggerheads are expected to be present at a density of about 1 animal per 500 square km and have a catch probability of 1 in 34,900 tows. However, since much of the tow time of the MOCNESS net is well below the foraging depth of turtles, the probability of capture is in fact, much lower.

Although a no impact determination on endangered species from these gear types has been made, and the likelihood of capture or entanglement of marine mammals in these gear types is exceedingly small during the deployment and retrieval of the nets from deep water tows, the following precautionary mitigating measures will be taken.

1. **Marine mammal and sea turtle observers.** Prior to deploying any sampling equipment, at least one observer shall be established to keep dedicated watch for marine mammals and sea turtles. The observer's sole purpose shall be to scan for marine mammals or sea turtles, with a focus of monitoring 180 degrees in front of the vessel's course, prior to the deployment of sampling gear. Since the intent of scanning for marine mammals and turtles is to assure that the gear is not deployed if marine mammals or turtles are shipside, a visual scan of the deployment area should be conducted for at least 30 minutes prior to deploying sampling gear. During night deployments night-vision binoculars or deck lighting with the naked eye may be used for monitoring. If marine mammals or turtles are observed in the vicinity of the vessel, deployment of sampling gear should not occur until protected species are verified to be clear of the area, or if not resighted, 30 minutes

after the initial sighting, until the chief scientist, in consultation with the captain deem that it is safe to do so.

2. **Keep all cables tight on sampling gear.** Protected species may become entangled in loose lines associated with sampling gear. Dolphins are known to become entangled in lazy lines on shrimp trawl nets, float lines of trap/pot gear, and buoy lines of gillnet gear, etc. Although none of the gear types under consideration here have lazy lines or other rope types, and cables are unlikely to entangle protected species, lines should not be allowed to become slack.

3. **If protected species are observed during sampling.** It is possible that marine mammals or turtles will be observed after sampling gear has been deployed but before sampling is complete. Given the small size of nets, the slow ship speeds, and the other factors outlined above for these sampling gears, any injurious interaction between the sampling gear and a turtle or marine mammal is still extremely small. However, if an observation is made while gear is in the water, the proximity of the observed animal to the sampling gear should be closely monitored and the gear should be removed from the water if there appears to be any potential for capture or entanglement.

If a protected species take occurs, the following measures shall be conducted:

1. **Report any marine mammal capture/entanglement immediately.** Marine mammal entanglements (live or dead) must be reported immediately to 1-877-WHALE HELP (1-877-942-5343).

2. **Report any sea turtle capture/entanglement immediately.** Immediately report any sea turtle takes to takereport.nmfsser@noaa.gov or Bob Hoffman at the NMFS Southeast Regional Office (727-403-2641). In the event of any unauthorized takes of sea turtles, sampling should cease until the harm avoidance measures can be reviewed with NMFS Southeast Regional Office, Protected Resources Division, and modified as needed.

3. **In the event of a live animal capture/entanglement within sampling gear,** work from the vessel as quickly and carefully as possible to disentangle the animal for prompt release. Ensure the marine mammal's blowhole and sea turtle's mouth are kept at the surface to ensure it can continue to breathe while disentangling. If possible, the animal shall be identified, photographed, and released directly back into the water to avoid further injury from being brought aboard the ship. If the animal is not able to be released directly back into the water, the animal and sampling gear shall be carefully placed on the deck of the ship, preventing the animal from falling on the deck and becoming further injured. For turtles, follow the turtle resuscitation guidelines (attached). For marine mammals, ensure the animal's blowhole is free of obstructions and work quickly and carefully to return the animal to the water.

4. **In the event of a mortality,** the animal shall be retained and guidance shall be given on how to maintain the carcass. The Principal Investigator or Chief Scientist shall seek

guidance from Wendy Teas (305-361-4595) for sea turtles and Blair Mase (305-361-4586) for marine mammals at the NMFS, Southeast Fisheries Science Center on how to retain the carcasses (i.e., whether they should be put in the cooler and immediately brought back to shore for sampling, or frozen for future sampling). Photos, measurements, and entanglement information shall also be documented per "NMFS' Protocol For Dead Entangled Small Cetaceans" (attached) or a sea turtle stranding form (attached) filled out and sent to Wendy Teas. Reports should also include whether mitigation measures were followed, and if not, an explanation provided.

Sea Turtle Resuscitation Guidelines

If a turtle appears to be unconscious or comatose, attempt to revive it before release. Turtles can withstand lengthy periods without breathing; a living comatose sea turtle may not move, breathe voluntarily, or show reflex responses or other signs of life. In other cases, a lightly comatose turtle may show shallow breathing or reflexes such as eyelid or tail movement when touched. Use the following method of resuscitation in the field if veterinary attention is not immediately available:

- Place the turtle on its plastron (lower shell) and elevate the hindquarters approximately 15 - 30 degrees to permit the lungs to drain off water for a period of 4 up to 24 hours. A board, tire or boat cushion, etc. can be used for elevation.

- Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the carapace and lifting one side about 3 inches, then alternate to the other side.

- Keep the turtle in the shade, at a temperature similar to water temperature at capture. Keep the skin (especially the eyes) moist while the turtle is on deck by covering the animal's body with a wet towel, periodically spraying it with water, or by applying petroleum jelly to its skin and carapace. Do not put the turtle into a container with water.

- Do not put the turtle on its carapace (top shell) and pump the plastron (breastplate) or try to compress the turtle to force water out, as this is dangerous to the turtle and may do more harm than good.

- Periodically, gently touch the corner of the eye or eyelid and pinch the tail near the vent (reflex tests) to monitor consciousness.

- Sea turtles may take some time to revive; do not give up too quickly. Turtles that are successfully resuscitated benefit from being held on deck as long as possible (up to 24 hours) to fully recover from the stress of accidental forced submergence.

- Release successfully resuscitated turtles over the stern of the boat, when fishing or scientific collection gear is not in use, the engine is in neutral, and in areas where they are unlikely to be recaptured or injured by vessels. A turtle that has shown no sign of life after 24 hours on deck may be considered dead and returned to the water in the same manner.

NMFS/SEFSC Photos

References:

Federal Register, December 31, 2001. Government Printing Office, Washington DC 66 (250), pp. 67495- 67496.

July 2009

Appendix B
Accidental Take Materials

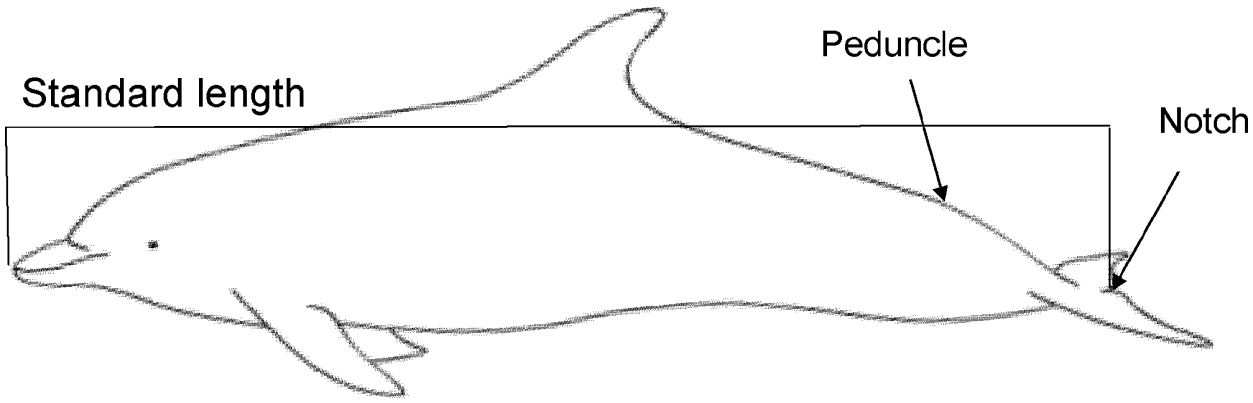
NMFS' PROTOCOL FOR DEAD ENTANGLED SMALL CETECEANS

In the event of a small cetacean mortality that is incidentally captured, please document the following items in addition to Title and Report Submitter.

1. Date of Incident.
2. Time of Incident.
3. Vessel name.
4. (a) Latitude of incident.
   (b) Longitude of incident.
5. (a) Describe where in the gear the animal was entangled.
   (b) Describe how the gear was wrapped around the animal.
6. (a) Indicate (yes or no) if animal was hauled onto vessel.
   (b) If no, briefly describe reason.

Provide Images

1. Photograph entire animal before removing from gear (with a scale bar if possible).
2. Photograph lateral view of dorsal fin (for photo-identification) with no gear (with a scale bar if possible).
3. Measure standard length (from tip of upper jaw to notch in the tail).
4. Photograph ventrum, including genital slits so sex can be determined (with a scale bar if possible).
5. After removal of gear, photograph any obvious signs of net impressions/lacerations or rope wounds (with a scale bar if possible).
6. Document where in the gear the animal was entangled/caught and how gear was wrapped around animal.



Please return this form to:
Stacey Horstman
NOAA NMFS
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

NATIONAL OCEANS AND ATMOSPHERIC ADMINSTRATION
NATIONAL MARINE FISHERIES SERVICE
PROTECTED RESOURCES

DEAD ENTANGLED SMALL CETECEANS REPORT

Title: | Report Submitted by:

1) Date of Incident | 2) Time of Incident

3) Vessel Name

4) (a) Latitude | 4) (b) Longitude

5) (a) Describe where in the gear the animal was entangled.

5) (b) Describe how the gear was wrapped around the animal.

6 (a) Could the entangled animal be hauled aboard the vessel? ☐ YES ☐ NO

6 (b) If NO, indicate the reason.

Provide Images as Indicated Below with this Report

☐ 1. Photograph entire animal before removing from gear (with a scale bar if possible).

☐ 2. Photograph lateral view of dorsal fin (for photo-identification) with no gear (with a scale bar if possible).

☐ 3. Measure standard length (from tip of upper jaw to notch in the tail).

☐ 4. Photograph ventrum, including genital slits so sex can be determined (with a scale bar if possible)

☐ 5. After removal of gear, photograph any obvious signs of net impressions/lacerations or rope wounds.

☐ 6. Document where in the gear the animal was entangled/caught and how gear was wrapped around animal.

Return this form to:
Stacey Horstman
NOAA NMFS
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

Print Form | Submit by Email

NOAA Fisheries Service

Southeast Region Ship Strike Report

Reporter Information

Reporting Vessel/Aircraft Name or # | Reporter's Name | Reporter's phone | Date of Report

Strike Vessel Information *(complete all that apply)*

TYPE OF VESSEL: Check all that apply

- ☐ Container
- ☐ Tanker
- ☐ Freight
- ☐ Research
- ☐ Fishing
- ☐ Towing
- ☐ Government
- ☐ Whale watch
- ☐ Ferry
- ☐ Recreational
- ☐ Other

Specify _____

Draft _____ ○ Feet ○ Meters

Forward _____

Aft _____

Mean _____

Name of Vessel involved in Strike | Gross Tonnage | Vessel Length ○ Feet ○ Meters

Vessel Make | Vessel Model | Propulsion | Engine Make

Distance between shafts | Horsepower | Prop Diameter | Prop Pitch

Observed or Noted Strike Information *(strike was noted visually or impact felt)*

Date of Strike | Time of Strike ○ Local ○ GMT | General Location | North Latitude | West Longitude

ENVIRONMENTAL CONDITIONS AT TIME OF STRIKE

Lighting | Weather | Visibility | Distance of Visibility ○ Kilometers ○ Miles | Air Temperature ○ Degrees F ○ Degrees C

Wind Speed | Direction (degrees) | Current Speed | Direction (degrees) | Water depth

Wave Height ○ Feet ○ Meters | Swell Height ○ Feet ○ Meters | Water Depth ○ Feet ○ Meters

NOAA Fisheries Service

Southeast Region Ship Strike Report - Continued

NAVIGATION INFORMATION AT TIME OF STRIKE

Vessel Activity	Engine RPMs	Engine Speed (Knots)	Vessel Course (Degrees)	Autopilot ON / Autopilot OFF

Total # of watchstanders	# on Navigation Bridge	# on Observation Bridge	# on Bow	Other

INCIDENT INFORMATION

Part of vessel struck by whale

Describe what was seen, felt, heard, etc.

Was avoidance action taken

Describe action taken, or reasons why avoidance not possible

Comments on damage to vessel

NOAA Fisheries Service

Southeast Region Ship Strike Report - Continued

ANIMAL INFORMATION

Time elapsed between sighting and collision

Distance from vessel when first sighted

Animal's orientation to the vessel

Estimated size/species of whale

Other marine mammals present?

Approximate number

Species

What direction was the whale traveling

Briefly describe whale's behavior prior to strike

Briefly describe whale's behavior after collision *(if seen)*

Portion of animal struck

Condition post-strike

Blood seen in water after strike

Description of wounds on animal. Use drawings to mark the location of wound(s). Include estimates of length and depth of wounds.

SEA TURTLE STRANDING AND SALVAGE NETWORK
Stranding Report

Observer's Name, address, phone #:

Stranding Date: | **Turtle number by day:** | **Coordinator notified within 24 hrs by:**

Stranding Location: | **Description of location: (be specific)**

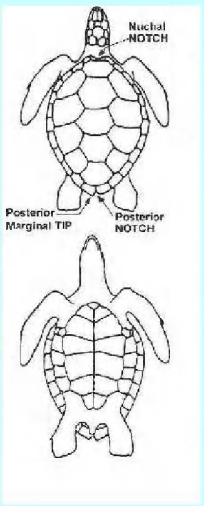
State:

County/Parish: | **Latitude:** | **Longitude:**

Turtle Condition: | **Yes** ☐ **No** ☐ **Carcass necropsied?** **Yes** ☐ **No** ☐ **Photos taken?**

Turtle Species: | **Yes** ☐ **No** ☐ **Species verified by coordinator?**

Sex: | **How was sex determined?** | **If tail extends beyond carapace enter amount in centimeters:**



CARAPACE MEASUREMENTS

Using calipers --

Straight length (NOTCH-TIP) ☐ cm ☐ in ☐

Min length (NOTCH-NOTCH) ☐ cm ☐ in ☐

Straight width (Widest Point) ☐ cm ☐ in ☐

Using non-metal measuring tape --

Curved length (NOTCH-TIP) ☐ cm ☐ in ☐

Min length (NOTCH-NOTCH) ☐ cm ☐ in ☐

Curved width (Widest Point) ☐ cm ☐ in ☐

Weight: ☐ kg ☐ lb ☐ est ☐ actual ☐

TAGS: *Contact coordinator before disposing of any tagged animal!!!*

Checked for flipper tags? Yes ☐ No ☐

Check all 4 flippers. Record tag numbers(s) /tag location / return address.

PIT tag scan? Yes ☐ No ☐

If found record number / tag location

Coded wire tag scan? Yes ☐ No ☐

If yes, record location (flipper).

Checked for living tag? Yes ☐ No ☐

If yes record location.

Mark wounds / abnormalities on diagrams at left and describe below. (note tar or oil, gear or debris entanglement, propeller damage, epibiota, papillomas, emaciation, etc.) **Please note if no wounds /abnormalities are found.**

FINAL DISPOSITION:

☐ 1. Left on beach where found: If painted indicate color below (8).

☐ 2a. Buried on beach. ☐ 2b. Off beach. ☐ 2c. Painted before buried.

☐ 3a. Parts salvaged. What, Why?

☐ 3b. Salvaged all.

☐ 4. Pulled up on beach dune: If painted indicate color below (8).

☐ 5a. Found alive, taken to rehab. Where?

☐ 5b. Found alive, released.

☐ 6. Left floating : If painted indicate color below (8).

☐ 7. Disposition unknown; explain:

☐ 8. Color painted:

INSTRUCTIONS FOR COMPLETING STSSN STRANDING REPORT FORMS

OBSERVER'S NAME/ADDRESS/PHONE#:
This is the person who handled the turtle in the field. Please give an address and phone number where you can be reached in the event we need to contact you for clarification of the reported data.

STRANDING DATE:
This is the date the stranded turtle was first reported or encountered. If you did not investigate until a later date, please note that in the remarks section at the bottom of the form. "Turtle Number by Day" is used to keep track of more than one turtle investigated on a single day by the same volunteer - your first turtle of the day is 01, second of the same day is 02, etc. Please notify the state coordinator within 24 hours for any stranding you document and check the box describing how the coordinator was notified.

STRANDING LOCATION:
Check "Offshore" if the turtle was found on an ocean beach or "Inshore" if the turtle was in a bay, river, sound, inlet, etc. Give a detailed descriptive location of the stranding using a reference point that can be found on a NOAA navigation chart. Local names or landmarks not found on most charts do not help pinpoint a location. Good reference points are inlets, fishing piers, light houses, water tanks, etc. Latitude/Longitude - if you have a GPS unit or are familiar with latitudes and longitudes and you have a navigation chart, please include the latitude/longitude of the stranding location. If you cannot provide accurate lat/longs, please leave this space blank. It then becomes even more important to provide a location description than can be pinpointed on a chart.

CONDITION:
Check the box that best describes the stranding. If the turtle seems intermediate between two stages of decomposition, pick the one that fits best. Fresh dead turtles should have no foul smell; moderately decomposed turtles smell bad, but skin and scutes are intact or are only beginning to peel, internal organs are still distinguishable; severely decomposed turtles smell very bad with scutes lifting or gone and skin beginning to peel or liquefy, internal organs beginning to liquefy, hard to distinguish individual organs; dried carcasses, leathery, internal organs completely decomposed.

TURTLE SPECIES:
Use the species identification key on the back of the form to positively determine species. If you are not positive of the species identification, check "Unidentified", please do not guess. Check boxes to indicate if photos were taken and if the state coordinator verified species. The state coordinator may verify species based on photos taken and submitted with the stranding report form.

SEX:
Check appropriate box(es). Sea turtles cannot be sexed externally until they are mature adults. If the turtle is not adult-sized (generally at least 92 cm straight length for loggerheads and green turtles, 60 cm straight length for Kemp's ridleys, 80 cm straight length for hawksbills and 130 cm curved length for leatherbacks) then you should check "immature, undetermined" if the turtle is not necropsied. Some males may begin to mature at slightly smaller sizes than those listed above and tail length should be documented if it is being used to externally sex a turtle.

CARAPACE MEASUREMENTS:
Use calipers to obtain straight measurements and /or flexible, non-metal measuring tape to obtain curved measurements. Measurement points are noted on drawings on left side of form. Circle units of measure -centimeters or inches; if units are not circled we cannot include measurements in the database.

FINAL DISPOSITION:
Check the box(es) next to the number that best describes what was done with the stranding after it was documented on the beach. Provide additional information regarding salvaged specimens. Record what rehabilitation facility live turtles were taken to.

TAGS: Contact state coordinator before disposing of any tagged animal!!

Flipper tags- check all flippers on all species and record information; note also if tag scars are seen.

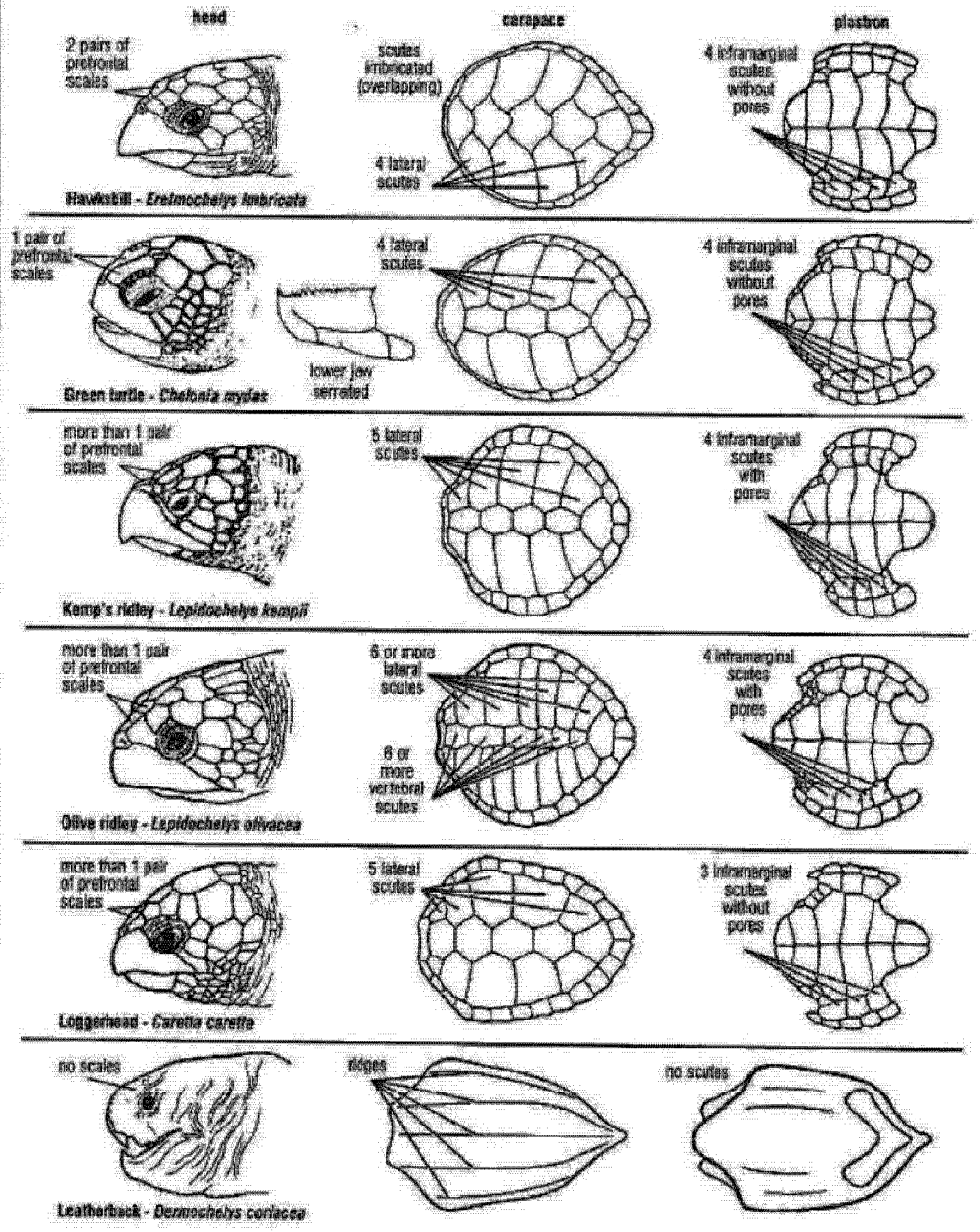
PIT tags -scan front flippers and shoulder areas of all species (see PIT tag scanning protocol for Specific instructions).

Coded wire tag scan -currently only being placed in front flipper region of Kemp's ridleys (see wire tag scanning protocol or specific instructions). Both front flippers and associated shoulder and "armpit" areas of all Kemp's ridleys should be salvaged for later scanning if a magnetometer is not available).

Living tags - check all Kemp's ridleys for light-colored areas on the dark carapace. Living tags are tissue transplants of the plastron onto the carapace which grow with the turtle and were used to mark head started turtles to distinguish between different ages. If you suspect a living tag is present the entire carcass should be salvaged. In most cases, Kemp's ridleys with living tags were also marked with external flipper tags, PIT tags and coded wire tags as well. The Cayman Turtle Farm has also used living tags on some green turtles to distinguish age and a couple of these have been documented by the STSSN; these turtles should have external flipper tags or tag scars as well.

REMARKS SECTION AT BOTTOM OF FORM:
Mark wounds/abnormalities on the diagrams at left and describe in detail. The more information you include, the easier it will be for us to code the record. Use the back of the data sheet to continue your remarks if needed. Always note anything unusual about a stranding event.

SPECIES IDENTIFICATION



Please use an envelope and mail original form to:

APPROPRIATE STATE STSSN COORDINATOR

A list of these state coordinators can be found at:

http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp